c) refluxing said organic solvent to produce a carbohydrate alkylthiosulfonate.

3. The method of Claim 2, wherein said phase transfer catalyst comprises a quaternary ammonium salt.

4. The method of Claim 3, wherein said quaternary ammonium salt is tetrabutylammonium iodide.

5. The method of Claim 2, wherein said organic solvent comprises a non-polar organic solvent.

6. The method of Claim 5, wherein said non-polar organic solvent comprises toluene.

7. The method of Claim 2, wherein said alkylthiosulfonate is methanethiosulfonate.

8. The method of Claim 7, wherein said methanethiosulfonate is a salt.

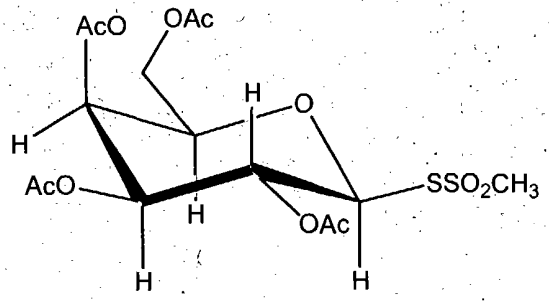
9. The method of Claim 2, wherein said carbohydrate comprises a monosaccharide.

10. The method of Claim 9, wherein said monosaccharide is selected from the group consisting of galactose, glucose and mannose.

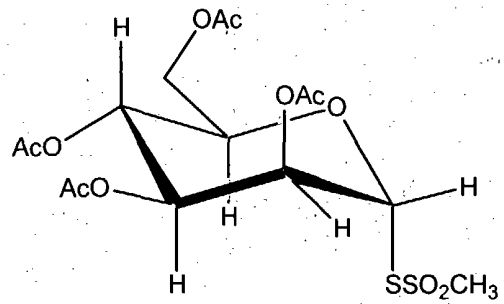
11. The method of Claim 2, wherein said carbohydrate alkylthiosulfonate is a β-anomer.

12. The method of Claim 2, wherein said carbohydrate alkylthiosulfonate is an α-anomer.

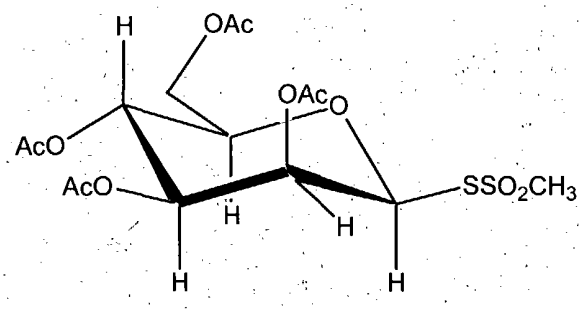
13. A composition of matter having the structure:



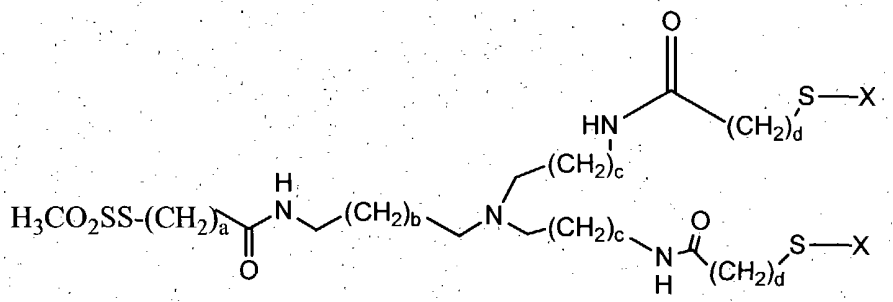
14. A composition of matter having the structure:



15. A composition of matter having the structure:



16. A glycodendrimer reagent composition having the structure:



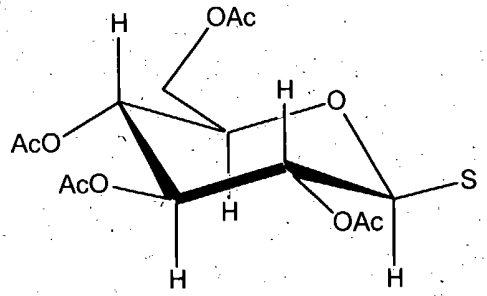
wherein a, b, c, and d are individually the same or different and are independently selected from the group consisting of integers from 0 to 10, wherein X = SR or R, and wherein R is a monosaccharide selected from the group consisting of galactose, glucose, mannose and lactose.

17. The composition of Claim 16, wherein said monosaccharide is galactose.

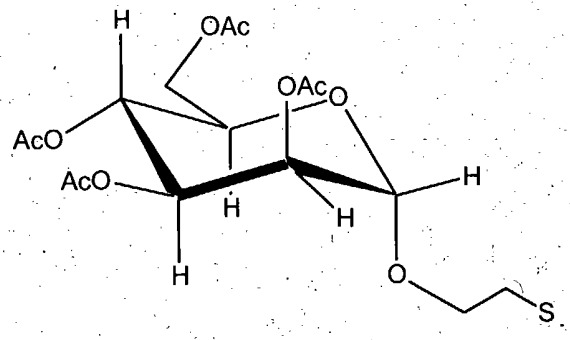
18. The composition of Claim 16, wherein said monosaccharide is glucose.

19. The composition of Claim 16, wherein said monosaccharide is mannose.

20. The composition of Claim 16, wherein X is



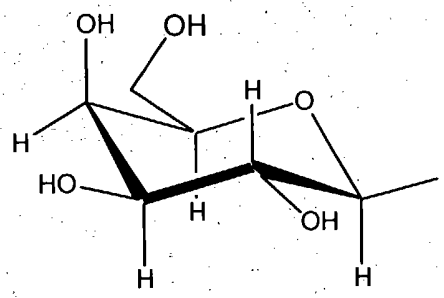
21. The composition of Claim 16, wherein X is



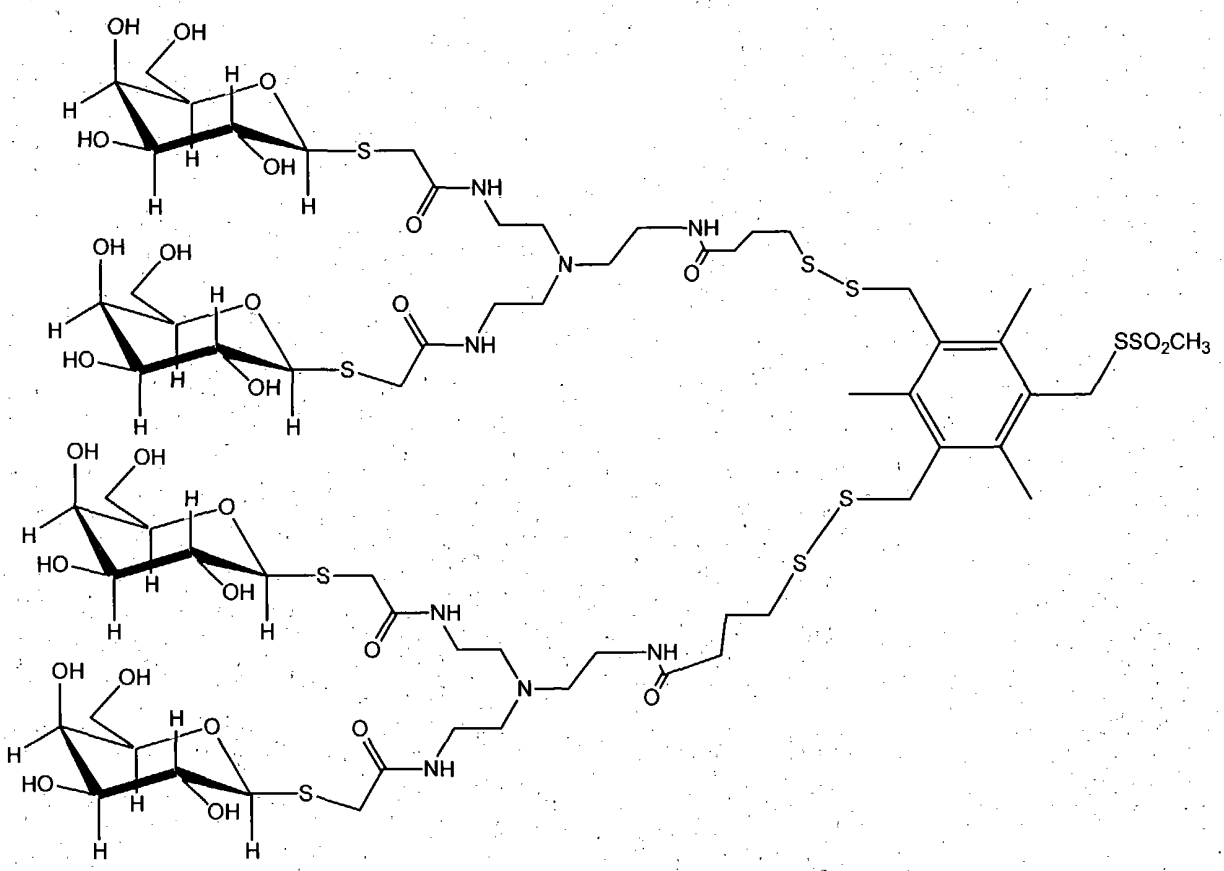
22. The composition of Claim 20, wherein a = 1, b =0, c = 1, and d = 1.

23. The composition of Claim 21, wherein a = 1, b =0, c = 1, and d = 1.

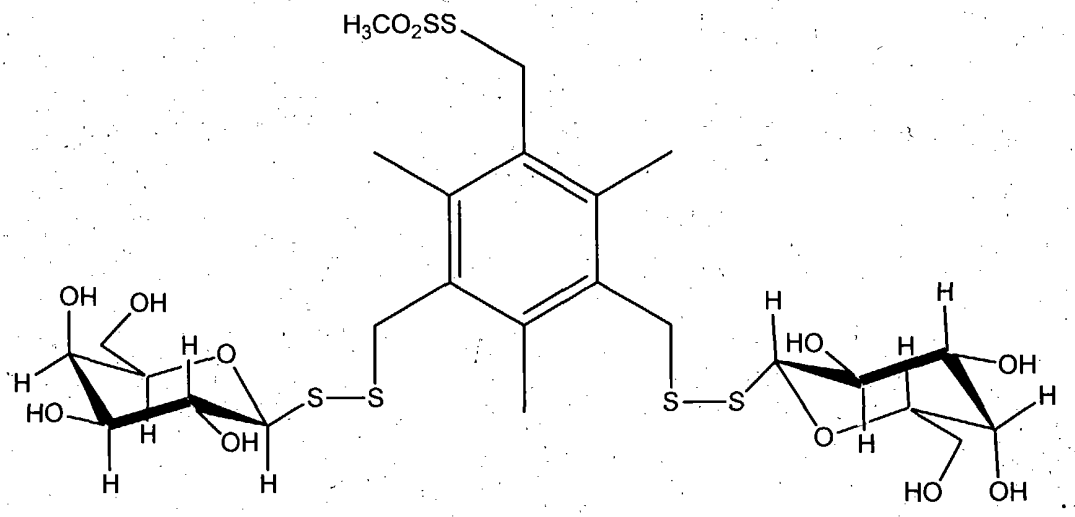
24. The composition of Claim 16, wherein a = 3, b =0, c = 1, d = 1, X is R, and R is



25. A glycodendrimer reagent composition having the structure:



26. A glycodendrimer reagent composition having the structure:



27. A method for inhibiting adhesin or lectin activity, comprising the steps of:

a) providing a modified protease, said modified protease having a thiol side chain comprising a carbohydrate moiety;

b) contacting said modified protease with a composition having an adhesin or lectin activity; and

c) incubating said modified protease with said composition such that the adhesin or lectin activity of said composition is inhibited.

28. The method of Claim 27, wherein said modified protease is a modified serine protease.

29. The method of Claim 28, wherein said modified serine protease is a modified subtilisin.

30. The method of Claim 29, wherein said modified subtilisin is a modified *Bacillus lentus* subtilisin.

31. The method of Claim 28, wherein said modified subtilisin is a modified *Bacillus amyloliquefaciens* subtilisin.

32. The method of Claim 27, wherein said carbohydrate moiety comprises a monosaccharide.

33. The method of Claim 32, wherein said monosaccharide is selected from the group consisting of glucose, mannose, and galactose.

34. The method of Claim 27, wherein said thiol side chain is selected from the group consisting of -S-β-Glc, -Et-β-Gal, -S-Et-β-Glc, -S-Et-α-Glc,-S-Et-α-Man, -S-Et-Lac, -S-β-Glc(Ac), -S-β-Glc(Ac)$_2$, -S-β-Glc(Ac)$_3$, -S-β-Glc(Ac)$_4$, -S-Et-α-Glc(Ac), -S-Et-α-Glc(Ac)$_2$, -S-Et-α-Glc(Ac)$_3$, -S-Et-α-Glc(Ac)$_4$, -S-Et-β-Glc(Ac), -S-Et-β-Glc(Ac)$_2$, -S-Et-β-Glc(Ac)$_3$, -S-Et-β-Glc(Ac)$_4$, -S-Et-α-Man(Ac), -S-Et-α-Man(Ac)$_2$, -S-Et-α-Man(Ac)$_3$, -S-Et-α-Man(Ac)$_4$, -S-Et-β-Gal(Ac), -S-Et-β-Gal(Ac)$_2$, -S-Et-β-Gal(Ac)$_3$, -S-Et-β-Gal(Ac)$_4$, -S-Et-Lac(Ac)$_5$, -S-Et-Lac(Ac)$_6$, -S-Et-Lac(Ac)$_7$, -S-β-Gal, -S-β-Gal(Ac), -S--β-Gal(Ac)$_2$, -S-β-Gal(Ac)$_3$, -S-β-Gal(Ac)$_4$, -S-β-Man, -S-β-Man(Ac), -S-β-Man(Ac)$_2$, -S-β-Man(Ac)$_3$, -S-β-Man(Ac)$_4$, -S-α-Man, -S-α-Man(Ac), -S-α-Man(Ac)$_2$, -S-α-Man(Ac)$_3$, and -S-α-Man(Ac)$_4$.

35 The method of Claim 27, wherein said composition comprises an adhesin or lectin from a bacteria.

36. The method of Claim 35, wherein said bacteria are *A. naeslundii*.

37. The method of Claim 30, wherein said modified *Bacillus lentus* subtilisin is S156C-SS-ethyl-2-(ß-D-galactopyranose).

38. The method of Claim 37, wherein said composition comprises an adhesin or lectin from a bacteria.

39. The method of Claim 38, wherein said bacteria are *A. naeslundii*.

40. The method of Claim 27, wherein said carbohydrate moiety is a dendrimer moiety.

41. The method of Claim 40, wherein said modified protease is a modified serine protease.

42. The method of Claim 41, wherein said modified serine protease is a modified subtilisin.

43. The method of Claim 42, wherein said modified subtilisin is a modified *Bacillus lentus* subtilisin.

44. The method of Claim 41, wherein said modified subtilisin is a modified *Bacillus amyloliquefaciens* subtilisin.

45. The method of Claim 40, wherein said dendrimer moiety comprises mesitylene.

46. The method of Claim 43, wherein said modified *Bacillus lentus* subtilisin is S156C-mes(SS-ß-Gal)$_2$.

47. The method of Claim 46, wherein said composition comprises an adhesin or lectin from a bacteria.

48. The method of Claim 47, wherein said bacteria are *A. naeslundii*.

LIST OF PENDING CLAIMS

1. A chemically modified mutant protein, said mutant protein comprising a cysteine residue substituted for a residue other than cysteine in a precursor protein, the substituted cysteine residue being subsequently modified by reacting said cysteine residue with a glycosylated thiosulfonate.

2. A method for producing a carbohydrate alkylthiosulfonate, comprising the steps of:

a) providing a carbohydrate, an alkylthiosulfonate, and a phase transfer catalyst;

b) reacting said carbohydrate and said alkylthiosulfonate in an organic solvent in the presence of said phase transfer catalyst; and

c) refluxing said organic solvent to produce a carbohydrate alkylthiosulfonate.

3. The method of Claim 2, wherein said phase transfer catalyst comprises a quaternary ammonium salt.

4. The method of Claim 3, wherein said quaternary ammonium salt is tetrabutylammonium iodide.

5. The method of Claim 2, wherein said organic solvent comprises a non-polar organic solvent.

6. The method of Claim 5, wherein said non-polar organic solvent comprises toluene.

7. The method of Claim 2, wherein said alkylthiosulfonate is methanethiosulfonate.

8. The method of Claim 7, wherein said methanethiosulfonate is a salt.

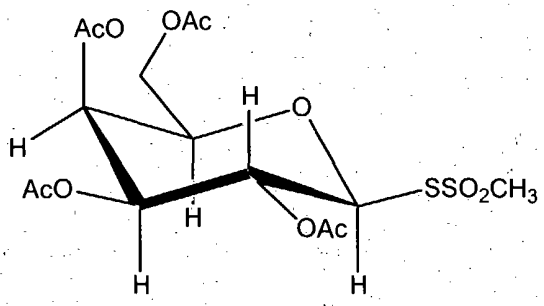
9. The method of Claim 2, wherein said carbohydrate comprises a monosaccharide.

10. The method of Claim 9, wherein said monosaccharide is selected from the group consisting of galactose, glucose and mannose.

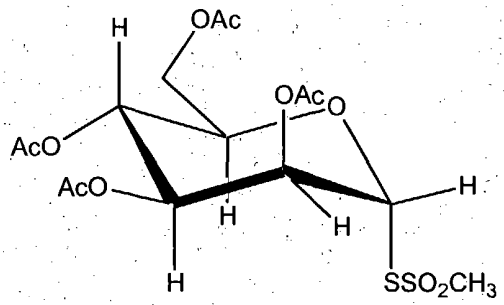
11. The method of Claim 2, wherein said carbohydrate alkylthiosulfonate is a β-anomer.

12. The method of Claim 2, wherein said carbohydrate alkylthiosulfonate is an α-anomer.

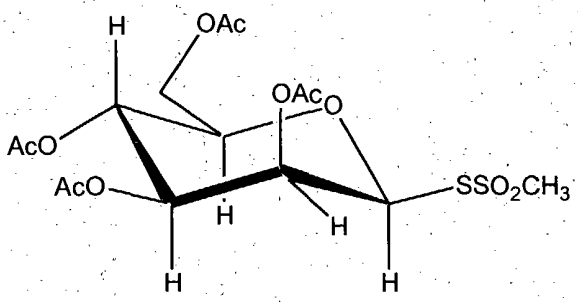
13. A composition of matter having the structure:



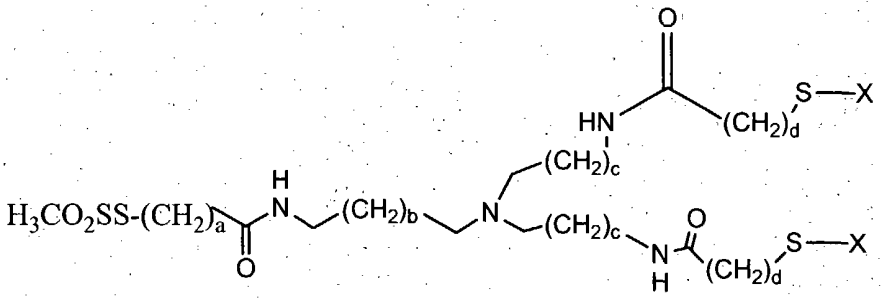
14. A composition of matter having the structure:



15. A composition of matter having the structure:



16. A glycodendrimer reagent composition having the structure:



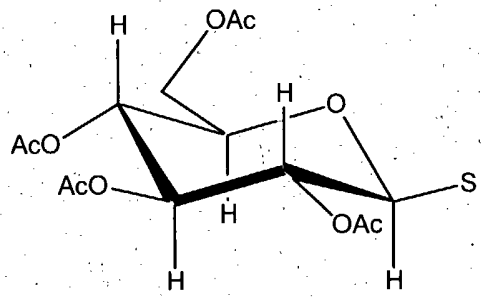
wherein a, b, c, and d are individually the same or different and are independently selected from the group consisting of integers from 0 to 10, wherein X = SR or R, and wherein R is a monosaccharide selected from the group consisting of galactose, glucose, mannose and lactose.

17. The composition of Claim 16, wherein said monosaccharide is galactose.

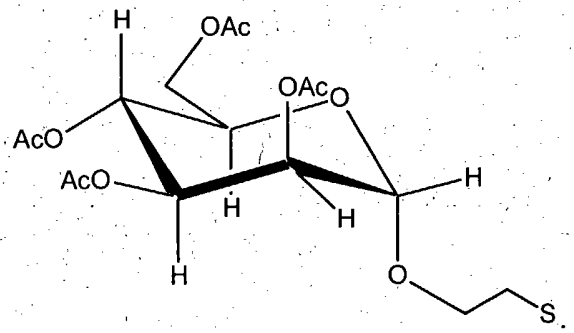
18. The composition of Claim 16, wherein said monosaccharide is glucose.

19. The composition of Claim 16, wherein said monosaccharide is mannose.

20. The composition of Claim 16, wherein X is



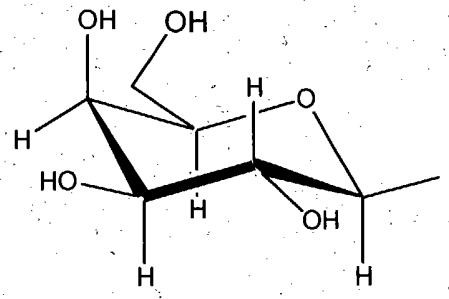
21. The composition of Claim 16, wherein X is



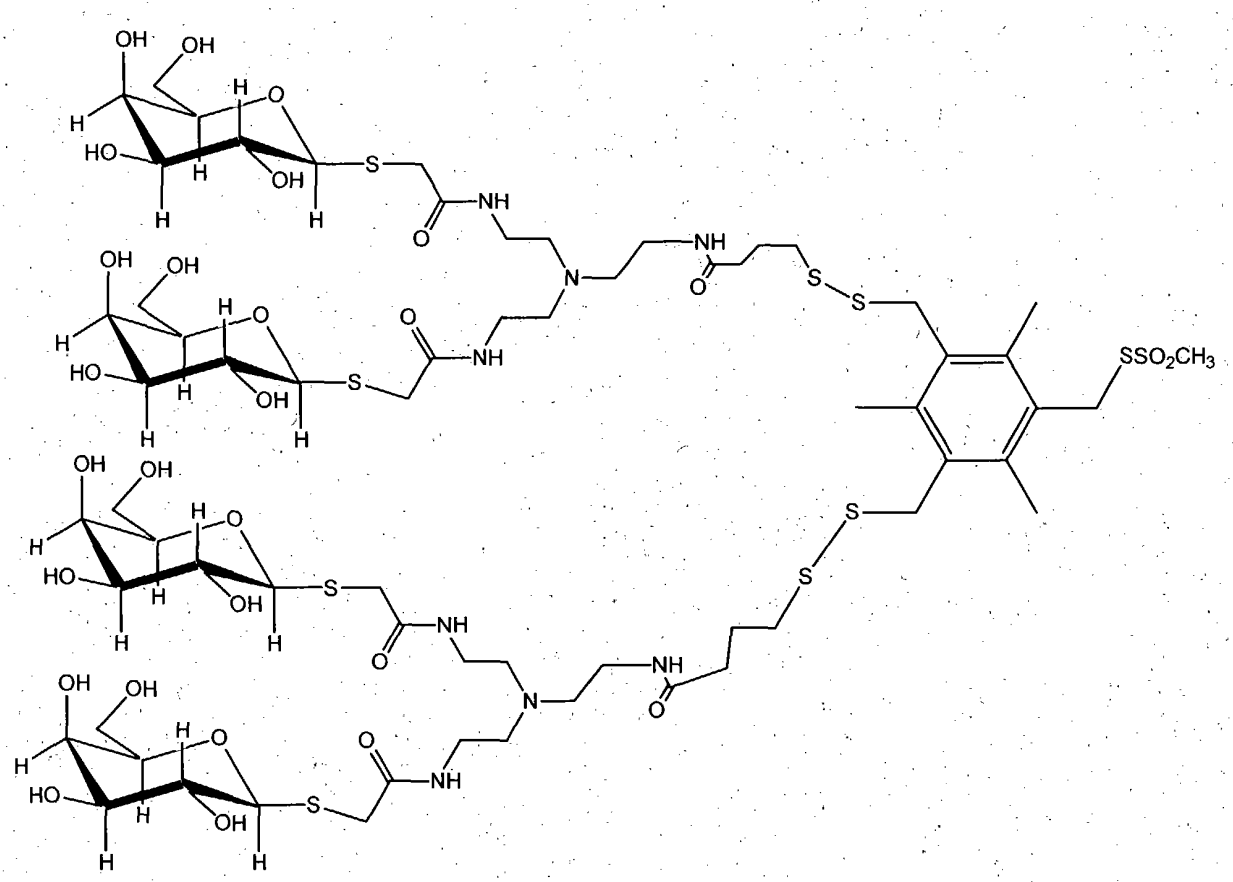
22. The composition of Claim 20, wherein a = 1, b =0, c = 1, and d = 1.

23. The composition of Claim 21, wherein a = 1, b =0, c = 1, and d = 1.

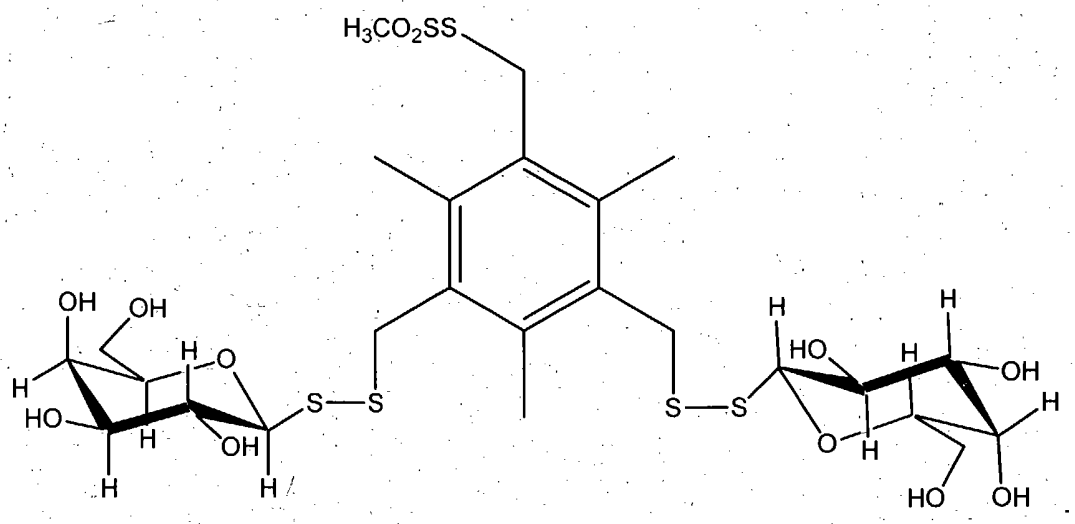
24. The composition of Claim 16, wherein a = 3, b =0, c = 1, d = 1, X is R, and R is



25. A glycodendrimer reagent composition having the structure:



26. A glycodendrimer reagent composition having the structure:



27. A method for inhibiting adhesin or lectin activity, comprising the steps of:

a) providing a modified protease, said modified protease having a thiol side chain comprising a carbohydrate moiety;

b) contacting said modified protease with a composition having an adhesin or lectin activity; and

c) incubating said modified protease with said composition such that the adhesin or lectin activity of said composition is inhibited.

28. The method of Claim 27, wherein said modified protease is a modified serine protease.

29. The method of Claim 28, wherein said modified serine protease is a modified subtilisin.

30. The method of Claim 29, wherein said modified subtilisin is a modified *Bacillus lentus* subtilisin.

31. The method of Claim 28, wherein said modified subtilisin is a modified *Bacillus amyloliquefaciens* subtilisin.

32. The method of Claim 27, wherein said carbohydrate moiety comprises a monosaccharide.

33. The method of Claim 32, wherein said monosaccharide is selected from the group consisting of glucose, mannose, and galactose.

34. The method of Claim 27, wherein said thiol side chain is selected from the group consisting of -S-β-Glc, -Et-β-Gal, -S-Et-β-Glc, -S-Et-α-Glc,-S-Et-α-Man, -S-Et-Lac, -S-β-Glc(Ac), -S-β-Glc$(Ac)_2$, -S-β-Glc$(Ac)_3$, -S-β-Glc$(Ac)_4$, -S-Et-α-Glc(Ac), -S-Et-α-Glc$(Ac)_2$, -S-Et-α-Glc$(Ac)_3$, -S-Et-α-Glc$(Ac)_4$, -S-Et-β-Glc(Ac), -S-Et-β-Glc$(Ac)_2$, -S-Et-β-Glc$(Ac)_3$, -S-Et-β-Glc$(Ac)_4$, -S-Et-α-Man(Ac), -S-Et-α-Man$(Ac)_2$, -S-Et-α-Man$(Ac)_3$, -S-Et-α-Man$(Ac)_4$, -S-Et-β-Gal(Ac), -S-Et-β-Gal$(Ac)_2$, -S-Et-β-Gal$(Ac)_3$, -S-Et-β-Gal$(Ac)_4$, -S-Et-Lac$(Ac)_5$, -S-Et-Lac$(Ac)_6$, –S-Et-Lac$(Ac)_7$, -S-β-Gal, -S-β-Gal(Ac), -S--β-Gal$(Ac)_2$, -S-β-Gal$(Ac)_3$, -S-β-Gal$(Ac)_4$, -S-β-Man, -S-β-Man(Ac), -S-β-Man$(Ac)_2$, -S-β-Man$(Ac)_3$, -S-β-Man$(Ac)_4$, -S-α-Man, -S-α-Man(Ac), -S-α-Man$(Ac)_2$, -S-α-Man$(Ac)_3$, and -S-α-Man$(Ac)_4$.

35 The method of Claim 27, wherein said composition comprises an adhesin or lectin from a bacteria.

36. The method of Claim 35, wherein said bacteria are *A. naeslundii*.

37. The method of Claim 30, wherein said modified *Bacillus lentus* subtilisin is S156C-SS-ethyl-2-(ß-D-galactopyranose).

38. The method of Claim 37, wherein said composition comprises an adhesin or lectin from a bacteria.

39. The method of Claim 38, wherein said bacteria are *A. naeslundii*.

40. The method of Claim 27, wherein said carbohydrate moiety is a dendrimer moiety.

41. The method of Claim 40, wherein said modified protease is a modified serine protease.

42. The method of Claim 41, wherein said modified serine protease is a modified subtilisin.

43. The method of Claim 42, wherein said modified subtilisin is a modified *Bacillus lentus* subtilisin.

44. The method of Claim 41, wherein said modified subtilisin is a modified *Bacillus amyloliquefaciens* subtilisin.

45. The method of Claim 40, wherein said dendrimer moiety comprises mesitylene.

46. The method of Claim 43, wherein said modified *Bacillus lentus* subtilisin is S156C-mes(SS-ß-Gal)$_2$.

47. The method of Claim 46, wherein said composition comprises an adhesin or lectin from a bacteria.

48. The method of Claim 47, wherein said bacteria are *A. naeslundii*.